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Report No. A.F.E.E./G.41

Date of issue. 27 MAR 1945

MINISTRY OF AIRCRAFT PRODUCTION

AIRBORNE FORCES EXPERIMENTAL ESTABLISHMENT
BEAULIEU, NEAR BROCKENHURST, HANTS.

M.A.P. Ref: SB.46196/RD.Airb.
A.F.E.E. Ref. S.2503/1/Tech
Date of tests. September - November 1944
Item No: A.1/3

Horsa II glider
Brief performance and handling tests

by
W. H. Bartram, M.Sc.

SUMMARY

Tests have been made on the Horsa II at a weight of 15,750 lb. These included measurements of position error by means of a trailing static and partial descents measured over a range of speeds with and without flap.

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1. Introduction

It was required to measure the performance and position error of the Horsa II glider and to compare its handling qualities with those of the Horsa I.

2. Description of glider

The Horsa II differs from the Horsa I mainly in the following particulars:-

To facilitate loading the nose now opens in a similar manner to that of the Hamilcar, the whole nose portion hinging on the starboard side so that large items of equipment - vehicles etc. - can be loaded straight in up the loading ramps.

The bridle tow of the Horsa I has been changed to chin tow on the Horsa II, the towing point being at the top of the nose wheel shock strut.

The rubber shock struts of the main and nose wheels of the Horsa I have been replaced by oil and spring struts, and tyre pressures have been reduced.

Twin nose wheels have been introduced to reduce shimmy.

The main skid has also been fitted with a spring and oil strut in place of the rubber shock absorber.

3. Loading details

The glider was loaded to an all-up weight of 15,750 lb. for these tests with C.G. at 6.03 ins. aft of datum. The light weight of this aircraft was 8,330 lb. This weight included three double seats, two single seats, loading ramps, air bottle, ladder, control locks, first aid kit and line intercommunication.

4. Measurements of Position Error

Position error was measured by means of a trailing static suspended from the partly open front door, in which position it hung clear of the under-carriage and main skid. The A.S.I. connected to this static was positioned on the instrument panel in the cockpit, side by side with the pilot's A.S.I.

The static head is in the centre of the fuselage above and to the rear of the cockpit. It is a Mk. 7A anti-ice head and dimensions are shown in Fig. 1.

The following measurements of position error were made.-

On tow in high position with zero flap between 140 and 160 m.p.h. A.S.I.
In free flight with half flap (40°) between maximum permissible speed, 110 m.p.h. A.S.I., and stalling speed, 63 m.p.h. A.S.I.
In free flight with zero flap between 80 m.p.h. A.S.I. and 160 m.p.h. A.S.I.
In free flight with full flap (80°) between maximum permissible speed, 110 m.p.h. A.S.I., and stalling speed, 60 m.p.h. A.S.I.

Results of all the above tests are given in Fig. 2.

5. Measurement of stalling speed

With zero flap the glider did not stall even with the trim fully back and stick pulled back slowly as far as possible. The speed dropped to 73 m.p.h. A.S.I. and there was some vibration at about 75 m.p.h. A.S.I.

With 40° flap the glider stalled at 63 m.p.h. A.S.I. There was a tendency for the starboard wing to drop, but this could easily be corrected by the use of opposite rudder. Warning of the onset of the stall was provided by moderate vibration at a speed some 5 m.p.h. above stalling speed.

With 80° flap the glider stalled at 60 m.p.h. A.S.I. in a similar manner to the half flap stall. With full flap there is considerable vibration at all speeds so that there is no actual warning of the onset of the stall.

6. Partial descents

Partial descents were made over a range of speeds from 160 m.p.h. A.S.I. to 80 m.p.h. A.S.I. with zero flap, 110 m.p.h. A.S.I. to 70 m.p.h. A.S.I. with 40° flap and from 100 m.p.h. A.S.I. to 70 m.p.h. A.S.I. with full flap.

The results are given in Figs. 3 and 4 and show that the minimum angles of glide are 4.3° with no flap at an A.S.I. of 95 m.p.h., 7.1° with half flap at an A.S.I. of 78 m.p.h. and 10.7° with full flap at an A.S.I. of 72 m.p.h. On the Horsa I (reference 1) the minimum angle of glide with no flap was 5.0°.

7. Handling in towed flight

The Horsa II is slightly less stable in yaw than the Horsa I and is less unstable laterally. It can be held out of position either by use of rudder alone or aileron alone.

8. Handling in free flight

Half flap and full flap - There was a tendency in the Horsa II under-going test to drop the starboard wing at the stall, but control could easily be regained in the normal manner.

9. Controls

9.1 General

There is slight play in the controls due to the push rod mechanism, this does not adversely affect the handling. The flaps come down considerably quicker than on the Horsa I. There are no dive brakes.

9.2 Brake control

The brake control has been changed. On the Horsa I it was situated on the side of the first pilot's seat; on the Horsa II there are thumb controls on both the first and second pilots' wheels. This is considered an improvement. The lay-out of the central control box is also improved and simplified.

On this aircraft no Mk. III C.A.L. was fitted nor was there T.R.9. Line intercommunication was used between tug and glider.

Except where a difference has been specified, the handling notes for the Horsa I glider (reference 2) are applicable to the Horsa II. It is considered, however, that the Horsa II is slightly more pleasant to fly than the Horsa I.

References

1 Performance of Horsa in free flight. Report No. A.F.&E./G.36 Part 3.

2 Handling tests on Horsa. Report No. A.F.E.E./G.36 Part 5.

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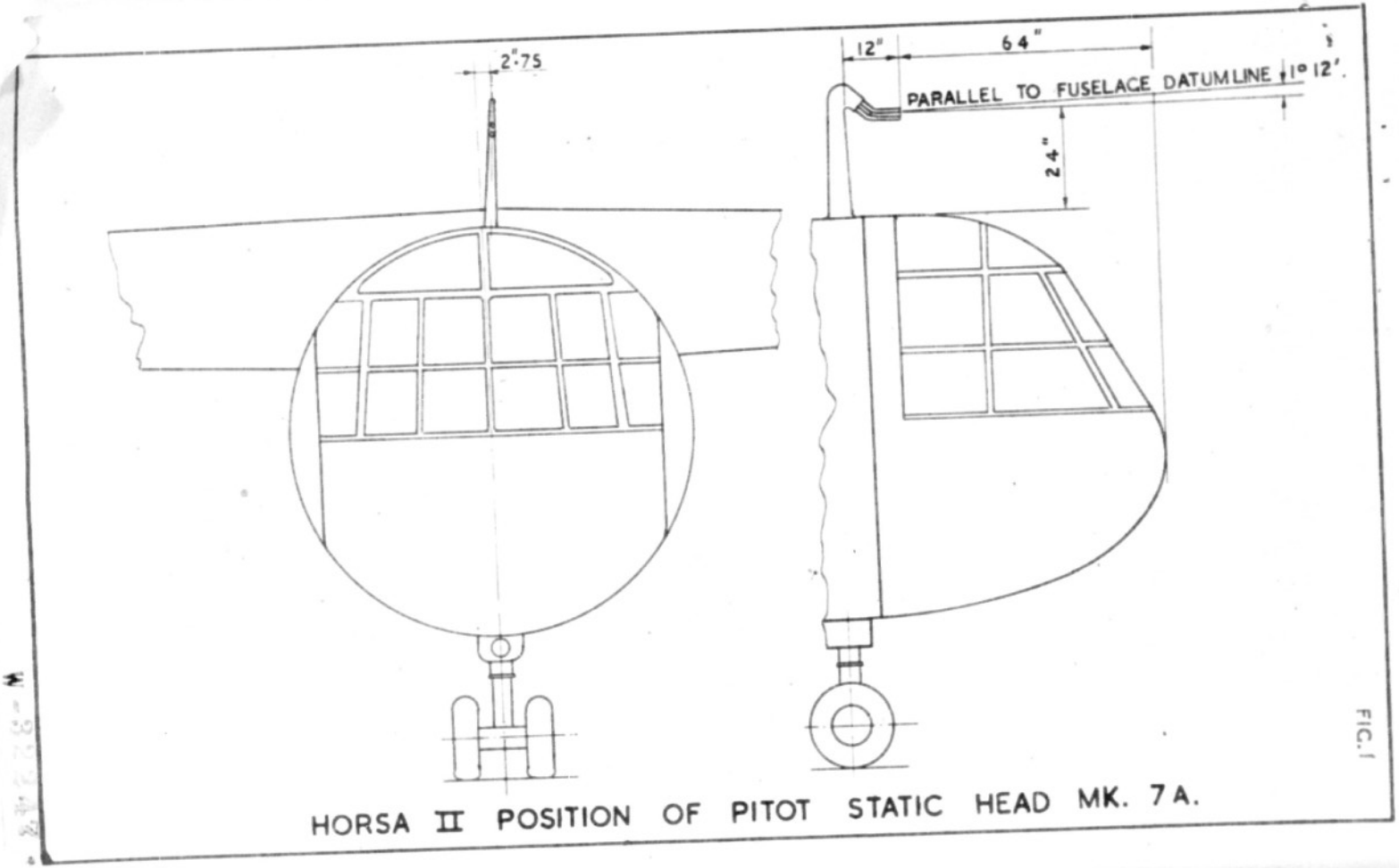
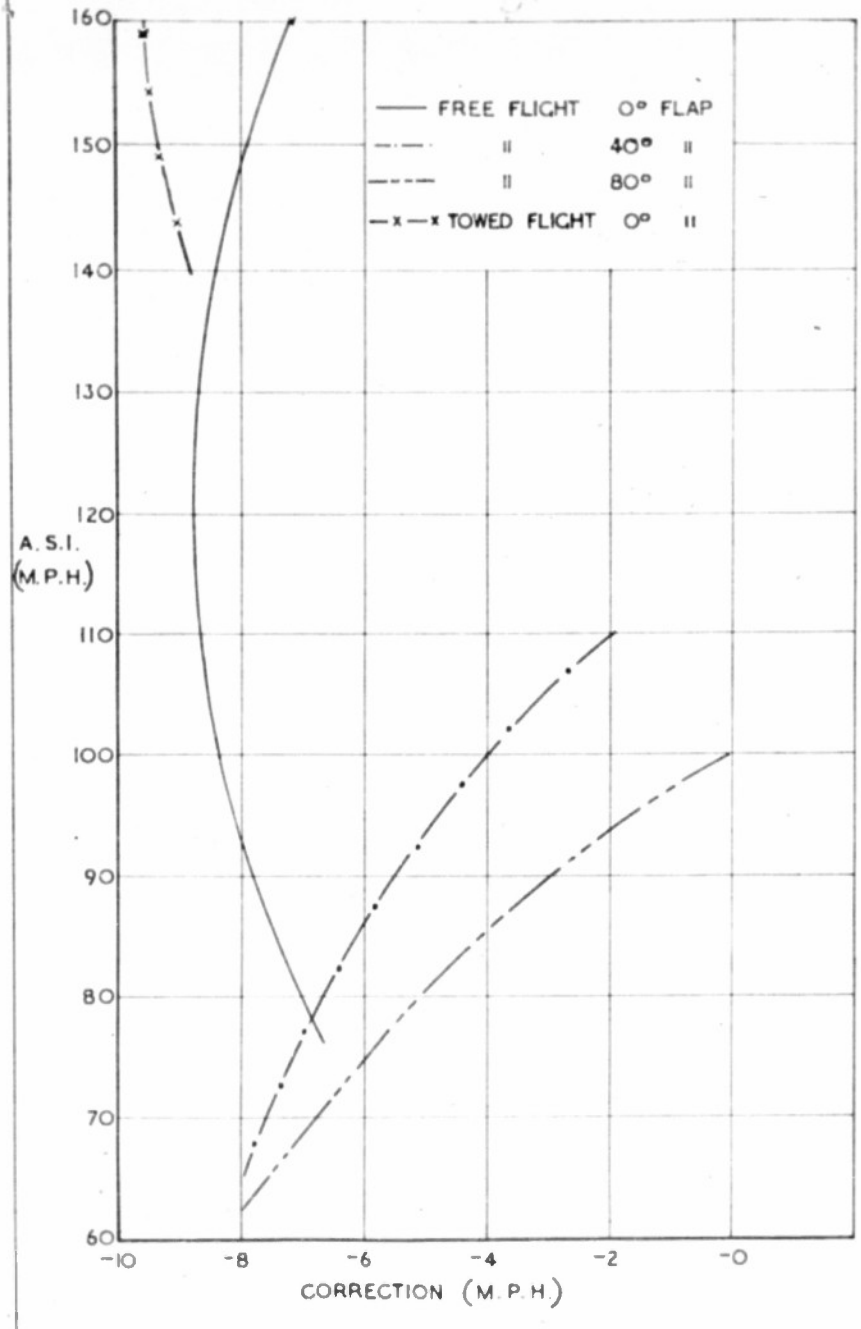


FIG. 1

HORSA II POSITION OF PITOT STATIC HEAD MK. 7A.

FIG. 2



HORSA II RN 309 WEIGHT 15,750 LB.

POSITION ERROR.

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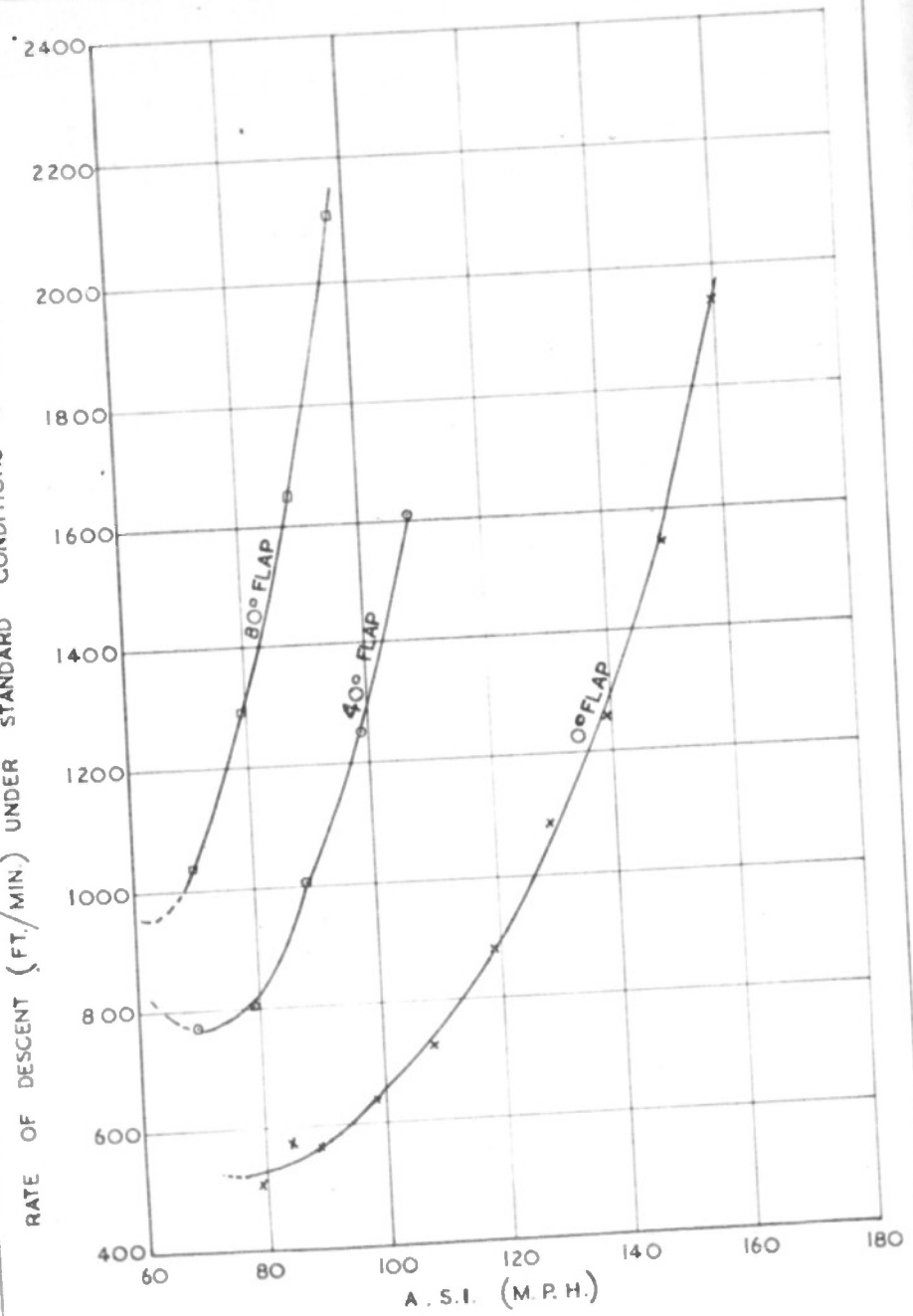
FIG. 3



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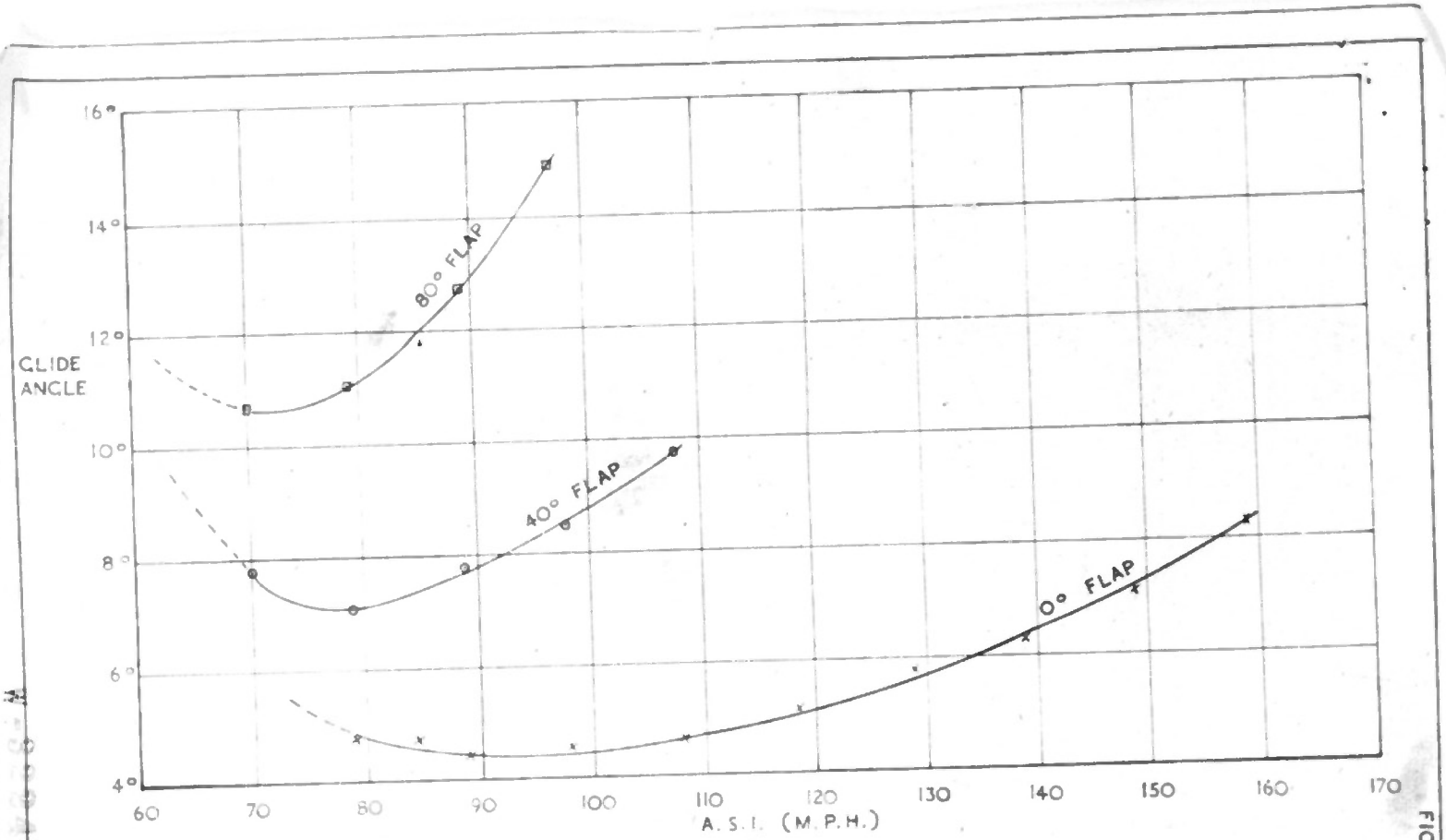

FIG. 4

HORSA II WEIGHT 15,750 LB. GLIDE ANGLES.

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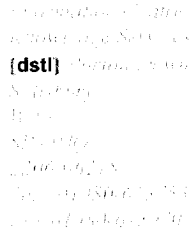

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